# Prologue: Terrified – Reading/Mining/Discussion Assignment

1. Google started out in 1998 with one "product". What was that "product"?
   **"Google started out in 1998 with one 'product': a website that used a novel, extraordinarily successful method for searching the web."**

2. In 2011, Google created an internal AI research group. What is this group called?
   **Google Brain**

3. What is the glue that unifies the diverse products, services, and blue-sky research efforts offered by Google and its parent company, Alphabet?
   **AI**

4. What is Google's ultimate aspiration, as reflected in the original mission statement of its DeepMind group?
   **"Solve intelligence and use it to solve everything else"**

5. Written in the 1970s, GEB was an outpouring of his many intellectual passions – mathematics, art music, language, humor, and wordplay, all brought together to address the deep questions of how intelligence, consciousness, and the sense of self-awareness that each human experiences so fundamentally can emerge from the non-intelligent, non-conscious substrate of biological cells. It's also about how intelligence and self-awareness might eventually be attained by computers. Who is he?
   **GEB was written by Douglas Hofstadter and inspired many young AI enthusiasts**

6. If you're a computer scientist, or a computer enthusiast, it's likely you've heard of it, or read it, or tried to read it. What is it?
   **"Godel, Escher, Bach: An Eternal Golden Braid or GEB"**

7. What did the magnetic button affixed to the Sigma-2 mainframe computer that her hobbyist/engineer dad built in MM's childhood home proclaim?
   **"I pray in FORTRAN"**

8. He described how, when he first started working on AI in the 1970s, it was an exciting prospect but seemed so far from being realized that there was no "danger on the horizon, no sense of it actually happening." Creating machines with humanlike intelligence was a profound intellectual adventure, a long-term research project whose fruition, it had been said, lay at least "one hundred Nobel prizes away." Whose perspective, in particular, on AI research are captured in these two sentences?

   **Douglas Hofstadter**

9. In the relatively early years, of computing machines, those who believed that AI was possible in principle considered these two philosophers, in particular, to be 'the enemy' due to their passionate arguments against the possibility of AI. Who were these two Berkeley philosophers?

   **John Searle and Hubert Dreyfus**

10. Near the end of GEB, Hofstadter had listed "Ten Questions and Speculations" about artificial intelligence. One of the questions was: "Will there be chess programs that can beat anyone?" What, beyond the word "no," did Hofstadter have to say in his speculation about this?

**"There may be programs that can beat anyone at chess, but they will not be exclusively chess players. They will be programs of *general* intelligence."**

11. In formulating his "dead wrong" speculation, Hofstadter was influenced by Eliot Hearst, a chess champion and psychology professor who had written extensively on how human chess experts differ from computer chess programs. Characterize Hearst's review of how human experts engage in the play of the game.

**"Experiments showed that expert human players rely on quick recognition of patterns on the chessboard to decide on a move rather than the extensive brute-force look-ahead search that all chess programs use. During a game, the best human players can perceive a configuration of pieces as a particular 'kind of position' that requires a certain 'kind of strategy'. That is, these players can quickly recognize particular configurations and strategies as instances of higher-level concepts. Hearst argued that without such a general ability to perceive patterns and recognize abstract concepts, chess programs would never reach the level of the best humans."**

12. IBM's Deep Blue machine? Please say a little something about it.

**The Deep Blue machine had hardware specialized for playing chess and still used a brute-force approach like its predecessors. However, it was the first machine to reach Grandmaster level and defeat the reigning world chess champion Garry Kasparov.**

13. After describing EMI, Hofstadter had asked the audience – including several music theory and composition faculty – to guess which of two pieces a pianist played form them was a (little-known) mazurka by Chopin and which had been composed by EMI. As one audience member described later, "The first mazurka had grace and charm, but not 'true-Chopin' degrees of invention and large-scale fluidity ... The second was clearly the genuine Chopin, with a lyrical melody; large-scale, graceful chromatic modulations; and a natural, balanced form." Many of the faculty agreed and, to Hofstadter's shock, voted EMI for the first piece and "real-Chopin" for the second piece. The correct answers were the reverse. Where did this scenario take place?

**Eastman School of Music in Rochester, New York**

14. Which word best describes Hofstader's feeling about what Google itself is trying to accomplish in AI – self driving cars, speech recognition, natural-language understanding, translation between languages, computer generated art, music composition, and more?

**Terror**

15. Hofstadter's worries are underlined by Google's embrace of Ray Kurzweil and his vision of the Singularity. What exactly is the Singularity?

**A point of time in the future when AI will: "empowered by its ability to improve itself and learn on its own, will quickly reach and then exceed human level intelligence"**

16. Hofstadter's feeling of terror with respect to AI was not about AI becoming too smart, too invasive, too malicious, or even to useful (and thus displacing workers). What was his terror with respect to AI about?

**"He was terrified that intelligence, creativity, emotions and maybe even consciousness itself would be too easy to produce – that what he valued most in humanity would end up being nothing more than a 'bag of tricks', that a superficial set of brute-force algorithms could explain the human spirit."**

17. Is Hofstadter a materialist?

**No, Hofstadter is concerned about AI and its impact on spiritual matters. He is concerned about the human spirit and character. He thinks AI will cheapen the idea of the human spirit… I think the AI spirit will be a companion and complement to the human spirit. AI will be humanities child, peer, and mentor, all at the same time.**

18. Mitchell quotes three well-known humans who have emphatically expressed their concerns about AI. Who are these three, and what did each have to say?

**Stephen Hawking claimed that "The development of full artificial intelligence could spell the end of the human race."**

**Elon Musk stated that AI is "our biggest existential threat"**

**And Bill Gates agreed and pondered why some people are not concerned.**

19. Mitchell quotes three well-known people who argue that worries about AI are premature, at best. Who are these three, and what did each have to say?

**Mitchell Kapor thinks "Human intelligence is a marvelous, subtle, and poorly understood phenomenon. There is no danger of duplicating it anytime soon.**

**Rodney Brooks agrees stating that we "grossly overestimate the capabilities of machines-those of today and of the next few decade".**

**And Gary Marcus asserts that in the quest to create "Strong AI, there has been almost no progress".**

20. In the last paragraph of the prologue, Mitchell articulates what the book is about. What does she say?

**She states that this book is not a general survey or history of AI. It is an in-depth exploration of how AI affects our lives now and in the future. The book is about understanding the accomplishments of the field and to speculate how far AI must go to argue for their own humanity.**